```
rcvr =

  1.0e+007 *

  Columns 1 through 4

   0.04409920017345   0.00000060000000   2.08408070980000   0.25497520000000
   0.04409920017345   0.00000170000000   2.21215906220000   0.24414390000000
   0.04409920017345   0.00000300000000   2.24433048210000   0.28053600000000
   0.04409920017345   0.00000100000000   2.33512535800000   0.27988480000000
   0.04409920017345   0.00000230000000   2.40088798980000   0.22946980000000
   0.04409920017345   0.00000220000000   2.44288966950000   0.23730120000000
   0.04409920017345   0.00000260000000   2.43939982070000   0.23439920000000
   0.04409920017345   0.00000050000000   2.50086207410000   0.28463080000000

  Columns 5 through 7

   0.00015890000000                   0   0.00000490000000
   0.00004840000000                   0   0.00000490000000
   0.00009730000000                   0   0.00000480000000
   0.00014840000000                   0   0.00000440000000
   0.00010290000000                   0   0.00000430000000
   0.00005540000000                   0   0.00000450000000
   0.00016680000000                   0   0.00000380000000
   0.00017830000000                   0   0.00000390000000

EDU» eph

eph =

  1.0e+005 *

  Columns 1 through 4

   4.40992001734540   0.00005000000000   4.46400000000000   4.46400000000000
   4.40992001734540   0.00006000000000   4.46384000000000   4.46384000000000
   4.40992001734540   0.00017000000000   4.46400000000000   4.46400000000000
   4.40992001734540   0.00030000000000   4.46400000000000   4.46400000000000
   4.40992001734540   0.00010000000000   4.46400000000000   4.46400000000000
   4.40992001734540   0.00023000000000   4.46400000000000   4.46400000000000
   4.40992001734540   0.00022000000000   4.46400000000000   4.46400000000000
   4.40992001734540   0.00026000000000   4.46384000000000   4.46384000000000

cont'd….
```

rcvr is an 8 x 7 matrix containing raw ranging information. Each of the 8 rows contains independent measurements for each of the 8 satellites in view at the current *epoch* (an epoch is simply a term that refers to a single discrete time; since our receivers provide data at approximately 1 sec. intervals, each epoch occurs approximately 1 sec. after the prior epoch). The columns of this matrix include the following data:

```
      Column 1: rcvr_tow;     -- receiver time of week (s)
      Column 2: svid;         -- satellite PRN number (1-32)
      Column 3: pr;           -- pseudorange (m)
      Column 4: cycles;       -- number of accumulated cycles
      Column 5: phase;        -- to convert to (0-359.99) mult. by 360/2048
      Column 6: slp_dtct;     -- 0 = no cycle slip detected; non 0 cycle slip
      Column 7: snr_dbhz;     -- signal to noise ratio (dB-Hz)
```

The "fun" part about working with the Garmin receivers is that you get the data output pretty much in the same format as the Garmins provide it. Thus, if you want the carrier phase measurement in meters (phi) (sometimes called integrated carrier phase), you must construct it from receiver columns 4-6. phi = (rcvr(4) + rcvr(5)/2048) * lambda. A non-zero value in column 6 indicates whether there has been a cycle slip for that satellite at the current epoch. If there has been a cycle slip for the current epoch, you should probably not use the carrier phase measurement at that epoch.

eph is a 8 x 24 matrix containing the *ephemeris* data from a GPS receiver. This data is used to estimate the orbital position of each satellite at any given time. Each row contains ephemeris data for a single satellite. The columns of this matrix include the following data:

```
Column 1: rcvr_tow;     -- receiver time of week (s)
Column 2: svid;         -- satellite PRN number (1-32)
Column 3: toc;          -- reference time of clock parameters (s)
Column 4: toe;          -- reference time of ephemeris parameters (s)
Column 5: af0;          -- clock correction coefcnt - group delay (s)
Column 6: af1;          -- clock correction coefficient (s/s)
Column 7: af2;          -- clock correction coefficient (s/s/s)
Column 8: ura;          -- user range accuracy (m)
Column 9: e;            -- eccentricity (-)
Column 10: sqrta;       -- square root of semi-major axis a (m**1/2)
Column 11: dn;          -- mean motion correction (r/s)
Column 12: m0;          -- mean anomaly at reference time (r)
Column 13: w;           -- argument of perigee (r)
Column 14: omg0;        -- right ascension (r)
Column 15: i0;          -- inclination angle at reference time (r)
Column 16: odot;        -- rate of right ascension (r/s)
Column 17: idot;        -- rate of inclination angle (r/s)
Column 18: cus;         -- argument of latitude correction, sine (r)
Column 19: cuc;         -- argument of latitude correction, cosine (r)
Column 20: cis;         -- inclination correction, sine (r)
Column 21: cic;         -- inclination correction, cosine (r)
Column 22: crs;         -- radius correction, sine (m)
Column 23: crc;         -- radius correction, cosine (m)
Column 24: iod;         -- issue of data number
```